REMARKS

By the present amendment, independent claim 1 has been amended to further clarify the concepts of the present invention. In particular, claim 1 has been amended to incorporate the subject matter of dependent claim 2 therein and claim 2 has been canceled. In addition, dependent claims 4, 6, 8, 10, 12, 14 and 16 have also been canceled. Entry of these amendments is respectfully requested.

In the Office Action, claims 1-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the '565 patent to Katayama et al in view of the '185 patent to Katayama et al. With regard to this rejection, it was noted that the cited patents apparently are commonly assigned and therefore not available as prior art. However, it was asserted that applicants must provide a statement in conformity with the provisions of Section 706.02(l) of the MPEP in terms of common ownership. Reconsideration of this rejection in view of the attached statement and the following comments is respectfully requested.

With regard to this rejection, applicants are providing a statement in conformity with the provisions of Section 706.02(l) of the MPEP in terms of common ownership. That is, applicants concurrently submit a Statement of Common Ownership relative to the cited patents to Katayama et al.

For the reasons stated above, withdrawal of the rejection under 35 U.S.C. § 103(a) and allowance of claims 1, 3, 5, 7, 9, 11, 13 and 15 as amended over the cited Katayama et al patents are respectfully requested.

Claims 1-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the patent to Nishi et al in view of the patent to Smith et al. In making this rejection, it was asserted that the former patent teaches the entire fuel hose as claimed except for using a polyester resin with a naphthalene ring in the outer layer. The latter patent to Smith et al was then alleged to teach the equivalence of a polyester resin with a naphthalene ring with the PBT polyester as disclosed by the Nishi et al patent. Reconsideration of this rejection in view of the above claim amendments and the following comments is respectfully requested.

Before discussing the rejection in detail, a brief review of the presently claimed invention may be quite instructive. The subject invention relates to an automotive fuel hose which comprises (1) a tubular inner layer comprising a fluororesin having a functional group, the fluororesin having impact strength of not less than 30 J/m at –40°C, the inner layer in which fuel is adapted to flow. The subject automotive fuel hose further comprises (2) a low fuel permeability layer comprising a polyester resin having a naphthalene ring, the low fuel permeability layer being laminated onto the inner layer such that respective mating interfaces contact each other.

According to the presently claimed invention, the functional group of the fluororesin for forming the inner layer of the automotive fuel hose interacts with the terminal carboxyl group or terminal hydroxyl group of the polyester resin having the naphthalene ring for forming the low fuel permeability layer of the hose. As a consequence, excellent inter-layer adhesion between the inner layer and the low permeability layer can be obtained. Therefore, since the mating interfaces do not require application of an adhesive or treatment with plasma, the low fuel permeability layer can be laminated onto the inner layer such that respective mating interfaces contact each other.

Furthermore, since the low fuel permeability layer is formed by the polyester resin having a naphthalene ring, the presently claimed automotive hose has excellent low fuel permeability and hydrolysis resistance. Still further, since the impact strength of the fluororesin having the functional group for forming the inner layer is not less than 30 J/m at -40°C, the impact resistance of the resultant hose is improved and the hose is more practicable as an automotive fuel hose as is set forth on pages 27 to 28 of the specification. It is submitted that such an automotive fuel hose, and the advantages and features realized thereby, are not taught or suggested by the cited patents to Nishi et al and Smith et al, whether taken singly or in combination, for at least two reasons.

First, the Nishi et al patent discloses a fuel hose having a laminated structure comprising an inner layer (A) made of a fluororesin and an outer layer (B) made of a

thermoplastic resin other than a fluororesin. As the thermoplastic resin other than a fluororesin for forming the outer layer (B), the Nishi et al patent discloses polyester such as polyethylene teraphthalate (PET) or polybutylene terephthalate (PBT), and polyamide. Additionally, the Nishi et al patent discloses that preferred material is a polyamide which is excellent in view of flexibility and low temperature impact resistance. Particularly preferred materials are polyamide 6, polyamide 11 and polyamide 12. It is specifically noted that the Nishi et al patent uses polyamide 12 for forming the outer layers (12) in all of the Examples.

Therefore, although the Nishi et al patent discloses polyamide and polyester having no naphthalene ring such as PET and PBT as the thermoplastic resin other than a fluororesin for forming the outer layer (B), the Nishi et al patent does not disclose or suggest the use of a polyester resin having a naphthalene ring such as polybutylene naphthalate (PBN) and polyethylene naphthalate (PEN) as is presently claimed. That is, the Nishi et al patent fails to teach or suggest the use of the polyester resin having a naphthalene ring such as PBN and PEN for forming the outer layer (B) of a fuel hose.

Second, the Nishi et al patent discloses that as a material for the inner layer (A), an ethylene/tetrafluoroethylene copolymer (ETFE) is the most preferred material. It is specifically noted that the Nishi et al patent uses ETFE for forming the inner layers (A) in all of the Examples. However, none of the fluororesins for forming the inner layer (A) has a functional group as is presently claimed.

Therefore, the Nishi et al patent fails to teach or suggest a fluororesin having a functional group for forming the inner layer (A). Further, the Nishi et al patent fails to teach or suggest the use of a fluororesin having a functional group having an impact strength of not less than 30 J/m at -40°C for forming the inner layer (A) of the fuel hose.

Since the inner layer (A) of the fuel hose of the Nishi et al patent is formed of a fluororesin not having a functional group, the inter-layer adhesion between the inner layer (A) and the outer layer (B) formed of a thermoplastic resin such as polyamide is deficient. Therefore, in the hose of the Nishi et al patent, it is necessary to melt bond the inner layer (A) and the outer layer (B) of a fluorinated adhesive resin layer. Since the Nishi et al patent interposes a fluorinated adhesive resin layer between the inner layers (A) and the outer layer (B) in all of the Examples, it would appear that the fluorinated adhesive resin layer is essential in the hose according to the Nishi et al patent.

While the Nishi et al patent appears to teach the use of a modified fluororesin having a functional group such as an epoxy group, this modified fluororesin is used to join the inner fluororesin layer to the outer polyester layer. Particularly, it is disclosed at lines 6-8 of column 5 that the inner layer (A) and the outer layer (B) are melt-bonded via a fluorinated adhesive resin, that is, a modified fluororesin having a functional group. Thus, the Nishi et al patent does not teach, as is presently recited in independent claim 1, an inner layer in which fuel is adapted to flow and which comprises a fluororesin having a functional group. Rather, the Nishi et al patent teaches that the fluororesin having a

functional group is used as an intermediate adhesive layer between a fluororesin layer and a polyester layer.

In contrast and as discussed above, in the automotive fuel hose as presently claimed, the functional group of the fluororesin for forming the inner layer interacts with the terminal carboxyl group or terminal hydroxyl group of the polyester resin having the naphthalene ring for forming the low fuel permeability layer of the hose. Consequently, excellent inter-layer adhesion between the inner layer and the low permeability layer can be obtained. Therefore, since the mating interfaces do not require application of an adhesive or plasma treatment, the low fuel permeability layer can be laminated onto the inner layer such that respective mating interfaces contact each other.

It is submitted that the Smith et al patent does not supply the above-noted teaching deficiencies of the Nishi et al patent with respect to the presently claimed automotive fuel hose. It was asserted in the Action that the Smith et al patent teaches that the polyester resin having the naphthalene ring is equivalent to the PBT polyester resin disclosed in the Nishi et al patent. However, the subject automotive fuel hose having a low fuel permeability layer formed of a polyester resin having a naphthalene ring such as PBN and PEN provides an unexpected effects that cannot be achieved by an automotive fuel hose having a low fuel permeability layer formed of a polyester resin having no naphthalene ring such as PBT.

More particularly, the unexpected effects of the subject automotive fuel hose are demonstrated with reference to Examples and Comparative Examples as contained in the subject specification as originally filed. For convenience, the attached Table is an extraction from Tables 1 to 3 of the specification. The attached Table shows a comparison between Example 2 and Comparative Example 5, which have identical constructions except for PBN and PBT forming the low fuel permeability layers. The Table shows Comparative Example 5 having the low fuel permeability layer formed of PBT is inferior to Example 2 in gasoline permeability, hydrolysis resistance, and adhesion, both at an initial stage and after filled with fuel.

The Table also shows a comparison between Example 3 and Comparative Example 6, which have identical constructions except PBN and PBT forming the low fuel permeability layers. It is to be noted that Comparative Example 6 having the low fuel permeability layer formed of PBT is inferior to Example 3 in gasoline permeability, hydrolysis resistance, and adhesion, both at an initial stage and after filled with fuel.

In summary, the above-described advantageous features and unexpected effects of the presently claimed invention are neither taught or suggested in the cited patents to Nishi et al and Smith et al. Therefore, the cited patents of Nishi et al and Smith et al, taken separately or in combination, would not achieve the automotive fuel hose as set forth in the subject claims.

For the reasons stated above, withdrawal of the rejection under 35 U.S.C. § 103(a) and allowance of claims 1, 3, 5, 7, 9, 11, 13 and 15 as amended over the cited Nishi et al and Smith et al patents are respectfully requested.

In view of the foregoing, it is submitted that the subject application is now in condition for allowance and early notice to that effect is earnestly solicited.

In the event this paper is not timely filed, the undersigned hereby petitions for an appropriate extension of time. The fee for this extension may be charged to Deposit Account No. 01-2340, along with any other additional fees which may be required with respect to this paper.

Respectfully submitted,

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Enclosures: Statement of Common Ownership
Table

Table

	Example		Comparative Example	
	2	3	5	6
Inner layer	Hydroxy-modified ETFE	Carboxylic anhydride-modified ETFE	Hydroxy-modified ETFE	Carboxylic anhydride-modified ETFE
Low fuel permeability layer	PBN	PBN	PBT	PBT
Outer layer	TPEE	TPEE	TPEE	TPEE
Thickness (mm)				
Inner layer	0.2	0.2	0.2	0.2
Low fuel permeability layer	0.1	0.1	0.1	0.1
Outer layer	0.7	0.7	0.7	0.7
Gasoline permeability (mg/m/day)	<0.1	<0.1	4	4
Hydrolysis resistance	○	○	×	×
Adhesion (N/cm)				
Initial	33	31	30	28
After filled with fuel	26	26	24	22
Impact resistance	○	○	○	○